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JOINT CONFERENCE ON OXYGEN AND TISSUE REPAIR ORGANIZED BY ECHM AND ETRS ON 27-28 OCTOBER 2006 IN RAVENNA, ITALY

The Joint Conference on Oxygen and Tissue Repair was organized by the European Committee for Hyperbaric Medicine (ECHM) and the European Tissue Repair Society (ETRS). It was held on 27th – 28th October 2006 in Ravenna, Italy.

The National Center for Hyperbaric Medicine, Institute of Maritime and Tropical Medicine in Gdynia - Medical University of Gdańsk participated in this conference.

As usually for the ECHM Conferences, the Ravenna Conference aimed to create an objective and complete review of current literature and knowledge on the particular topic. This time, the subject was oriented to oxygen and tissue repair, and this reflects interest of medical practitioners in treatment of problematic wounds which frequently are accompanied by the local hypoxia. Experts in the subject were chosen from a broad range of relevant background. They presented their review of the literature before a jury and an audience. Thereafter, the jury gathered in a secluded place to discuss the presentations, and presented its finding in a statement that includes recommendations for clinical practice based on the evidence that was presented. The application of the Evidence-Based Medicine methodology to the conference process helps the jury members to reach a consensus and strengthens the final recommendations.

The Scientific Committee of Ravenna Conference consisted of J. Niinikoski (ECHM, ETRS), L. Teot (ETRS) and D. Mathieu (ECHM) and the Jury consisted of J. Niinikoski (Finland, Chairman), D. Bakker (The Netherlands), T. Hunt (USA), F. Lind (Sweden), R. Mani (UK), M. Romanelli (Italy), T. Wild (Austria), F. Cronje (South Africa) and J. Schmutz (Switzerland).

Presentations were given by international experts in the field. They covered the broad range of problems, including role of oxygen in acute and chronic wound healing and infection treatments, role of hyperbaric oxygenation (HBO) in the management of diabetic foot lesions, limb ulcers and radionecrosis, role of the Evidence-Based Medicine in the HBO therapy and cost effectiveness of the HBO therapy.

Based on experts' presentations, the Jury had the task to answer the following questions:

1. What are the incidence and the cost of wounds with delayed healing?
2. What tissue changes induced by hypoxia lead to delayed wound healing?
3. What are methods available in clinical practice to evaluate tissue hypoxia as a responsible factor for delayed wound healing?
4. What is rationale to add Hyperbaric Oxygen Therapy to the conventional treatment of delayed wound healing?
5. Which patients are most susceptible to benefit from adjunctive Hyperbaric Oxygen Therapy?
6. May Hyperbaric Oxygen Therapy be cost-effective in the management of patients with delayed wound healing?
7. What studies have to be conducted in the next future to solve the remaining controversies?

The final recommendations of the Jury are still awaited, as the complete document with references and recommendations types with levels of evidences are still being processed by the editorial board. However some obvious conclusions can be drawn from presentations to be clinically and scientifically useful until the final ECHM and ETRS consensus recommendations come.

The incidences of wounds with delayed healing are high for diabetic foot ulcers, arterial and venous insufficiency, pressure ulcers and radionecrosis. Moreover, the treatment costs for all of those enlisted clinical items are high. It was reminded that oxygen is an important factor in wound healing, as hypoxia interferes with many components of problem wounds. The role of oxygen in inflammatory phases is well documented, however open questions are which type of bacteria are sensitive to hypoxia and which clinical parameters (CRP, fibrin, procollagen, leukocytes, neutrophils) are involved. There are strong evidences that angiogenesis and collagen production are directly sensitive to oxygen, and in clinical situations with oxygen deficiency the granulation tissue is not formed. On the other hand, there is no data on oxygen and apoptosis of myofibroblasts in the remodelling phase.

Concerning methods to evaluate tissue hypoxia, it is quite clear that there are many methods that are more for research than for clinical management, which include PET scans, and MRI derived techniques. On the other hand, direct measurement of tissue oxygen is invasive and therefore its usage is restricted in clinical practice. Other methods can be used for non-direct measurement of oxygenation (eg. near infra-red reflectance spectrophotometry, transcutaneous measurement of partial oxygen pressure) or perfusion (eg. ankle and toe pressure measurements, duplex ultrasonography, laser Doppler flowmetry). Each technique offers subtly different information of microvascular function and all of them require carefully derived protocols for use in order to derive reliable data.

During the Ravenna Conference it was concluded that presently, there is reliable evidence that HBO is effective in reducing major amputations in patients with diabetic foot lesions. However, prior to admitting patient for HBO therapy for any problem wound, there should be complete clinical evaluation and correction of systemic and local factors underlying the delayed healing of the wound. In every case, the possibilities of revascularisation must be considered and either carried out or excluded. Any evidences of infections and hypoxia should be documented.

The analysis of cost-effectiveness in the management of patients with delayed wound healing is difficult. The prospective research is recommended, and unless it will be commenced, certain assumptions have to be made to simplify calculations. Nevertheless, based on some data, HBO therapy for the problem wounds not only appears to be clinically effective, but also likely to reduce general costs of a nation's healthcare, reduces the social impact of related illness and offers better quality of life.

Finally, the general opinion was presented by the Jury that all practitioners using HBO in problem wounds should be properly trained in wound healing and should use tools already developed in order to quantify clinical results. Moreover, it was stressed that a network of basic and clinical research conducted in several centres should be implemented with establishment of a directory of centres and teams involved in the subject. This should be accompanied by organisation of seminars and workshops, probably with exchange of personnel between hyperbaric facilities.

In summary, the Joint Conference on Oxygen and Tissue Repair by ECHM and ETRS was a very important scientific event which brought reliable conclusions useful for clinical practice. Even more important is the fact that this conference was conducted according to the Evidence-Based Medicine rules and in cooperation between two different groups of specialists trying to find the consensus. We are all waiting impatiently for final document with recommendations.

(Contributed by Jacek Kot)